Fukushima Dai-ichi and the Ocean: 10 years of study and insight Abstract Submission Form : Entry # 36

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Session

What happened

Abstract Title (English, limited to 300 characters)

Localization of uranium-bearing particles in environmental samples from the Fukushima restriction zone

Abstract (English)

The Fukushima Dai-Ichi Nuclear Power Plant (FDNPP) accident that occurred in March 2011 released significant quantities of radionuclides into the environment. Ten years after the accident, questions still remain about the processes that led to the partial core meltdown of reactors 1 and 3. So far, answers have been provided by the investigation of particles containing caesium and sometimes uranium. The study of these particles allows characterising the FDNPP signature, which may also provide information on the source reactor and thus on the conditions that prevailed in the reactors during the accident. Accordingly, our objective is to develop a method for locating uranium-bearing particles in environmental samples collected in the vicinity of FDNPP. To identify and locate particles containing uranium, three methods have been adapted to these environmental samples including 1) the method of fission tracks already used in the field of non-proliferation studies, 2) imaging plates that are currently used in the context of the dismantling of nuclear facilities, and 3) the BeaQuant®, an instrument which has been developed for detecting radioactive particles in the fields of biology and geosciences.
Here, a sample collected nearby FDNPP, which may contain particles comprising both radio-caesium and uranium, was selected along with a quality control sample containing only uranium oxide particles to evaluate the efficiency of the detection of alpha particles with the different autoradiography methods.
The first results of this comparison of autoradiography methods for the detection of uranium-bearing particles in Fukushima samples will be presented. One of these methods was particularly efficient for detecting both natural and anthropogenic uranium.
The next steps of this study will be to implement the method identified as optimal to isolate and characterise particles released

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by FDNPP. The full characterization of these particles (size, morphology, elemental and isotopic compositions) will be very helpful to determine their origin and improve our understanding of their formation processes within the reactors and anticipate their fate in the environment.